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***Tachysphex austriacus* KOHL, restored from synonymy,
and *T. pompiliformis* (PANZER)
(Hymenoptera, Apoidea, Crabronidae), two sibling species**

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A b s t r a c t : *Tachysphex austriacus* KOHL 1892, a Palearctic species, is restored from synonymy and redescribed. Differences with the most closely related species, *T. pompiliformis* (PANZER 1805), are discussed.

Key words : Hymenoptera, Apoidea, Crabronidae, *Tachysphex*, Palearctic region, taxonomy, description.

Introduction

Tachysphex austriacus KOHL 1892 was described from one female collected in Vienna (KOHL 1892). Kohl himself recognized that this species was extremely similar to *T. pectinipes* (LINNAEUS 1758), currently *T. pompiliformis* (PANZER 1805). He mentioned two main characters of the new species: the sculpture of the scutum and scutellum and the vertex as wide as half of flagellomere I + flagellomere II combined. The second character is not useful in distinguishing the species from *T. pompiliformis*. The character is present in all the examined specimens of both species.

In the catalog of hymenopterous insects of Czechoslovakia (ZAVADIL et al. 1937) two specimens were recorded from Bohemia, however these records were not repeated in key to sphecids of Czechoslovakia (ZAVADIL & ŠNOFLÁK 1948).

T. pompiliformis is a heterogeneous complex which consists of many morphological and ecomorphological forms. PUŁAWSKI (1971) considered two of them as separate species (*T. ferrugineus* PUŁAWSKI 1967, and *T. opacus* MORAWITZ 1893). Based on a study of large material from a wide range of the Palearctic region one further species is here recognized: *Tachysphex austriacus*. This species is much more differentiated morphologically from *T. pompiliformis* than the two species mentioned above, especially by the structure of male genitalia.

Material and methods

Acronyms of depositories of material examined:

HNHMHungarian Natural History Museum, Lajos Zombori (Budapest, Hungary)

JSPC.....	Jakub Straka (Praha, Czech Republic)
NHMW	Naturhistorisches Museum Wien, Stefan Schödl, (Vienna, Austria)
OLML	Biologiezentrum/Oberösterreichisches Landesmuseum, Fritz Gusenleitner (Linz, Austria)
PTLC	Pavel Tyrner (Litvínov, Czech Republic)

Abbreviations of morphological terms:

WML.....	width of median lobe of clypeus
LCL.....	maximum length of clypeus
WCL	width of clypeus
LA3	length of antennal article III dorsally
WA3	width of antennal article III apically
LA5	length of antennal article V dorsally
WA5	width of antennal article V apically
WV.....	vertex width
LV	vertex length
DOA.....	diameter of anterior ocellus.

Additional morphological terms are adopted from BOHART & MENKE (1976) and KROMBEIN & PULAWSKI (1994).

The holotype of *T. austriacus* was labelled as follows: "HOLOTYPUS ♀ / *Tachysphex / austriacus* KOHL, 1892 / Jakub Straka det. 2004" printed on red paper. Exact label data are cited for the holotype only. Separate label lines are indicated by slash "/" and separate labels by double slash "//".

Diagnostic characters

Both *Tachysphex austriacus* and *T. pompiliformis* belong to *Tachysphex pompiliformis* species group sensu PULAWSKI (1971). They differ from all related species from the species group by the following.

Male and female: galea and glossa short – galea as wide as long, apex densely setose, glossa shorter than galea, trochanters densely punctate (punctures small), all femora and tibia black, fore- and midfemora uniformly sculptured throughout, with only small punctures and equal interspaces, lateral parts of tergum II with variably sparse punctuation and shiny interspaces, terga I-III with silvery apical bands.

Male: clypeus arcuate with conspicuous lobe corners, mesopleuron rugose to punctate, interspaces dull, forebasitarsus without rake.

Female: clypeus with lateral incisions and without median emargination or with rudimentary median emargination, mesopleuron rugose to densely, indistinctly punctate, dull.

Males

- Frons sparsely punctate at least along frontal line, interspaces distinct and shiny. Scutum and scutellum sparsely punctate, punctures in central parts more than one diameter apart, interspaces variable, unsculptured to densely microsculptured and dull, in some specimens punctures less than one diameter apart, but interspaces well developed and distinct, punctures large, similar as in *T. psammobius* (Kohl 1880), usually slightly larger than in *T. pompiliformis*. Mesopleuron rugose, especially hypopleural area and posterior part without distinct punctures, dull, mesopleuron along scrobal sulcus and in lower parts less rugose, punctures usually developed, less than one diameter apart, interspaces distinct, microsculptured and more or less shiny. Gonostyle with less than 20 setae, setae not directly shortened continuously towards the apex. Characteristic form of volsella, specific shape and ventral setae on volsella in one line (Figs 1 and 2). Abdomen black, sometimes tergum I and apex of tergum II dark red to brown or apices of terga I and II dark red to brown, remaining terga black. In Mongolian specimens terga I and II usually red to dark red. Length: (5.0-) 5.5-7.0 (-7.5) mm. Usually on sandy dunes or alluvial sands, rare. *Tachysphex austriacus* KOHL
- Frons at most with impunctate frontal line, other parts of frons densely punctate, interspaces almost indistinct. Scutum and scutellum more densely punctate, punctures usually less than half diameter apart. Interspaces distinct, small, and shiny to dull. Mesopleuron variable in sculpture, usually more rugose, densely punctate and dull, sometimes as in *T. austriacus*. Gonostyles with more than 20 setae, setae shortened continuously towards apex. Characteristic form of volsella, specific shape and ventral setae on volsella grow up stochastically from width base (Figs 4 and 5). Abdomen often partly red, rarely all black, especially in Europe black specimens are very rare. Length: (5.5-) 6.0-8.0 (-8.5) mm. Various biotopes, common. *Tachysphex pompiliformis* (PANZER)

Females

- Scutal punctures in central part more than one diameter apart, interspaces shiny, in some specimens punctures less than one diameter apart and interspaces slightly microsculptured, but interspaces well developed and shiny, punctures usually large, similar as in *T. psammobius*, larger than in *T. pompiliformis*. Scutellum often more sparsely punctate than scutum. Mesosternum with larger and more distinct punctures than in *T. pompiliformis*. Forebasitarsal rake almost uncoloured and often with four long apical spines close to each other (Fig. 3), usually dependent on the size of the body. In the smallest specimens the fourth (apical) spine can be separated from three apical spines as in *T. pompiliformis*. Rake on second tarsus with four long and one short spine. Length: (6.5-) 7.0-8.0 (-8.5) mm. Usually on sandy dunes or alluvial sands, rare. *Tachysphex austriacus* KOHL
- Scutum and scutellum more densely punctate, all punctures of scutum smaller and less than one diameter apart. Interspaces smaller than or as large as punctures, shiny, sometimes densely microsculptured and dull. Scutellum often more sparsely punctate than scutum but punctures at most one diameter apart. Mesosternum evenly sculptured with small ill-defined punctures and small interspaces. Forebasitarsal rake slightly reddish to dark and usually with three long apical spines close to each other and one additional a little separated from three apical spines. This character is dependent on the body size. In the largest specimens all four spines can be close to each other similarly as in *T. austriacus*. Colour of spines also depend on age of specimen: in old specimens the spines can be highly discoloured. Tarsomere II usually with three long and one or two shorter rake spines, sometimes in large specimens with four long and one shorter rake spin. Length: (6.5-) 7.5-9.0 (-10.0) mm. Various biotopes, common. *Tachysphex pompiliformis* (PANZER)

Description

***Tachysphex austriacus* KOHL 1892, restored from synonymy (Figs 1-3)**

Tachysphex austriacus KOHL 1892: 215, Holotype: ♀, Austria: Vienna: Türkenschanze; in NHMW.

Synonymized with *T. pompiliformis* (PANZER 1805) by PUŁAWSKI 1971: 62.

KOHL 1893: 32. DALLA TORRE 1897: 678. ZAVADIL et al. 1937: 201. ZAVADIL & ŠNOFLÁK 1948: 150. FRANZ 1949: 13. VOGRIN 1955: 37. DOLLFUSS 1989: 13

T. pompiliformis form *tenebricosus*: SCHMIDT in BITSCH et al. 2001: 268.

Type material: Holotype: Austria: Wien, Türkenschanze, 12.viii.1895, 1♀, A. Handlirsch leg.; labels: "12.8.95. / Handl. // Austr. inf. / Türkenschanz // *austriacus* / K. / det. Kohl Type", [handwriting, name of collector and word "det." printed]. Holotype in NHMW.

Additional material examined: Czech Republic: Central Bohemia: Lysá nad Labem, 50°11'N 14°46-47'E, 8.vi.1950, 1♂, 1♀, A. Hoffer leg., OLML; Southern Moravia: Dolní Bojanovice, 48°50'N 17°00'E, viii.1942, 1♂, 1♀, Hodonín env., vii.1942, 1♀, A. Hoffer leg., OLML; Germany: Rheinland-Pfalz: Ingelheim-Nord, Mainz 10 km W, 49°59'N 08°05'E, 24.vii.1993, 1♀, Ch. Schmid-Egger leg., JSPC; Ludwigshafen, Birkenheide, 49°28'N 08°16'E, 2.vi.1993, 1♂, O. Niehuis leg., JSPC; Hungary: Bács-Kiskun: Kecskemét, Nyomás, 18.vii.1962, 1♀, Sólymosné leg., HNHM; Kecskemét, 23.vi.1987, 1♂, J. Halada leg., OLML; Csongrád: Ásotthalom, 3.vii.1973, 1♀, L. Móczár leg., HNHM; Pest: Órkeny, 47°07'N 19°25'E, 180 m, 16.viii.2000, 1♀, J. Straka leg., JSPC; Somogy: Órtilos, Szentmihályhegy, 46°18'N 16°55'E, 21.vi.1920, 1♀, Sajó leg. HNHM; Kazakhstan: Matay desert, 46°00'N 78°36'E, 23.-25.vi.1995, 3♀♀, J. Halada leg., OLML; Mongolia: on Arvayheer – Bulgan neer Dalanzadgad road, 1600 m, 22.vii.2002, 1♂, J. Straka leg., JSPC; Hujirt env., Orhon waterfall, 46°54'N 102°28'E, 1600 m, 20.vii.2002, 2♂♂, 1♀, J. Straka leg., JSPC; Ulaanbaatar 100 km S, 23.vi.2003, 1♀, J. Halada leg., JSPC; Ulaanbaatar env., Tuul riv., 12.vii.2003, 1♂, 3♀♀, J. Halada leg., JSPC; Dalanzadgad 40 km W, Gobi Altai, approximately 43°30'N 104°00'E, 2000 m, 28.-30.vi.2003, 3♂♂, J. Halada leg.; Slovakia: Chotín, 47°48'N 18°14'E, 12.vii.1981, 1♂, P. Tymer leg., PTLC, 1.viii.1960, 1♀, 13.vii.1962, 1♂, 30.vii.1970, 1♀, 27.vii.1974, 1♀, Z. Pádr leg., vi.1977, 1♂, M. Kocourek leg., OLML; Somotor, 48°24'N 21°49'E, vii.1960, 1♂, M. Kocourek leg., OLML.

Additional material (not examined): Germany: Brandenburg: Schönowe Heide, Berlin 20 km NNE, approximately 52°40'N 13°30'E, 23.vii.2000, 1♂; Rheinland-Pfalz: Ingelheim-Nord, Mainz 10 km W, 49°59'N 08°05'E, 26.v.1993, 1♀, 7.vi.1993, 1♂, 8.vi.1993, 1♂, 6.vii.1993, 2♂♂, 1♀; 24.vii.1993, 2♂♂, 4♀♀; Walldrohrbach, 49°10'N 07°57'E, 22.vi.1993, 1♂; Ludwigshafen, Birkenheide, 49°28'N 08°16'E, 2.vi.1993, 3♂♂, 11.viii.1993, 1♂, 1♀; Mainz-Mombach, 50°01'N 08°09'E; 3.viii.1961, 1♂, 1♀, H. Wolf leg.; Speyer, 49°20'N 08°27'E, 29.v.1993, (all leg. and coll. Ch. Schmid-Egger in litt. 2003).

Redescription of holotype: ♀

Body length. 7.5 mm.

Head. Labrum flat, free margin rounded. Clypeus distinctly convex, clypeal lip sinuate with very small, irregular median emargination, and distinct lateral incisions. Limit of clypeal basomedian area and bevel relatively sharp, basomedian area as long as bevel, in the middle much shorter, bevel shiny, with several large punctures, basomedian area and lateral section densely punctate, punctures well defined, however partly hidden by dense, silver pubescence. Antennae relatively short: LA3 = 0.3 mm, LA5 = 0.4 mm. Frons and vertex densely and uniform punctate, punctures less than half diameter apart, interspaces larger on vertex along the compound eyes, slightly shiny to shiny, vertex setae very short, semierect, less than 1 x DOA, postocellar impression distinct, semicircular, flat. Malar space and adjacent part of gena with several larger punctures and relatively large shiny interspaces, this part continuously grade to densely punctate gena. Gena with small, ill-defined punctures, about one diameter apart, pubescence short, relatively dense, sculpture of integument visible.

Thorax. Scutum sparsely punctate, punctures well defined, in central part half to more than one diameter apart, interspaces slightly microsculptured, shiny, lateral parts more densely punctate, anterior part more densely sculptured to rugose, dull. Scutellum sculptured as central part of scutum. Mesopleuron finely rugose to densely punctate, dull, hypopleural area and posterior part of mesopleuron without distinct punctures and the remaining part densely punctate-rugose, interspaces small, slightly shiny, barely visible. Mesosternum densely punctate, punctures relatively well defined. Propodeal dorsum rugose, with irregular and ill-defined longitudinal ridges. Propodeal sides obliquely striated, interspaces microsculptured, dull. Ventral part of all trochanters densely punctate, punctures small, ill defined about one diameter apart, interspaces shiny. Forebasitarsal rake almost uncoloured, with three long apical spines close to each other and one other a slightly separated from three apical spines (not typical). Wings almost hyaline to slightly brownish with brown veins.

Abdomen. Terga I-III with distinct silver apical bands and slightly transparent apical part. Tergal punctures ill defined evanescent in fine microsculpture, also apical depressions with punctures, but less distinct, terga slightly shiny. Pygidium sparsely punctate, punctures relatively large, interspaces distinctly microsculptured, slightly shiny. Central part of sternum II with several distinct large punctures, interspaces slightly microsculptured, shiny, lateral parts densely micropunctate, slightly shiny, other sterna with uniform sculpture similar to that on the sternum II, but lateral parts are more or less reduced.

Coloration. Median part of mandibles, two or three distal tarsal segments, tegulae and three anterior abdominal segments red. Other parts of body completely black.

Variability of females: Body length: 6.5-8.5 mm.

Head. Labrum flat or almost flat, margin rounded or slightly emarginated. Clypeus, $WML:LCL = 1.6-1.7$, $WCL:WML = 1.7-1.9$. Antennae relatively short, $LA3:WA3 = 2.3-2.5$, $LA5:WA5 = 2.8-2.9$. Frons and vertex densely and uniformly punctated, punctures usually less than half diameter apart, on vertex along compound eyes are not always interspaces larger, $WV:LV = 1.1-1.3$.

Thorax. Scutum sparsely punctate, however punctures rarely, no more than one diameter apart, interspaces unsculptured or slightly microsculptured, more or less shiny. Mesopleuron finely rugose to variably densely punctate and variably dull. Propodeal sides obliquely striated, sometimes striae ill defined. Ventral part of trochanters densely punctate, punctures small, sometimes well defined, less than one to two diameters apart, interspaces shiny. Forebasitarsal rake almost uncoloured often with four long apical spines close to each other (Fig. 3).

Abdomen. Tergal punctures ill-defined evanescent in fine microsculpture, more or less distinct. Pygidium sparsely punctate, interspaces microsculptured to unsculptured.

Coloration: Median part of mandibles, tarsi variably, tegulae and two or three anterior abdominal segments red. Other parts of body completely black.

General description of male. Body length: 5.0-7.5 mm.

Head. Mandible with one weaken inner tooth and thin incision distally next to tooth. Labrum flat or almost flat, margin rounded. Clypeus slightly to distinctly convex, lip arcuate, sometimes with distinct lobe corners, basomedian area densely punctate, bevel variable, usually as long as the basomedian area, shiny with a few larger punctures, interspaces unsculptured, $WML:LCL = 1.1-1.7$, $WCL:WML = 2.4-2.8$. Antennae relatively

short, LA3:WA3 = 1.6-2.0, LA5:WA5 = 2.3-2.6. Frons densely punctate usually less than one diameter apart, however at least along the frontal line sparsely punctate, interspaces distinct and shiny. Vertex densely punctate, punctures one to less than one diameter apart, interspaces slightly shiny, setae very short, semierect, less than $1 \times \text{DOA}$, postocellar impression distinct, semicircular, flat, WV:LV = 1.4-1.6.

Thorax. Scutum and scutellum sparsely punctate, large punctures in central part more than one diameter apart, interspaces variable, unsculptured to densely microsculptured and dull, rarely punctures less than one diameter apart, but interspaces always well developed and distinct, lateral parts more densely punctate, anterior part more densely sculptured to rugos, dull. Mesopleuron rugosely sculptured, especially hypopimeral area and posterior parts without distinct punctures, dull, mesopleuron along the scrobal sulcus and in lower parts less rugosely sculptured, punctures usually developed, less than one diameter apart, interspaces distinct, microsculptured and more or less shiny. Mesosternum densely punctate. Propodeal dorsum rugose with irregular and ill-defined longitudinal ridges. Propodeal sides obliquely striated, interspaces microsculptured, dull. Ventral part of all trochanters relatively densely punctate, punctures small, sometimes well defined, less than one to two diameters apart, interspaces shiny. Forefemoral notch small, semicircular, but well-defined with microsculptured, dull surface. Wings almost hyaline to slightly brownish with brown veins.

Abdomen. Terga I-III with distinct silver apical bands, apical depressions of all terga slightly transparent, especially in first three well developed. Tergal punctures ill-defined evanescent in microsculpture, also apical depressions with several punctures, but in two anterior terga less distinct. All sterna with uniform sculpture similar to that on terga, but punctures are usually more distinct and dense. Gonostyles with less than 20 setae on apical half, setae not directly shortened continuously towards apex. Characteristic volsella, specific shape, ventral setae on volsella in one line (Figs 1 and 2).

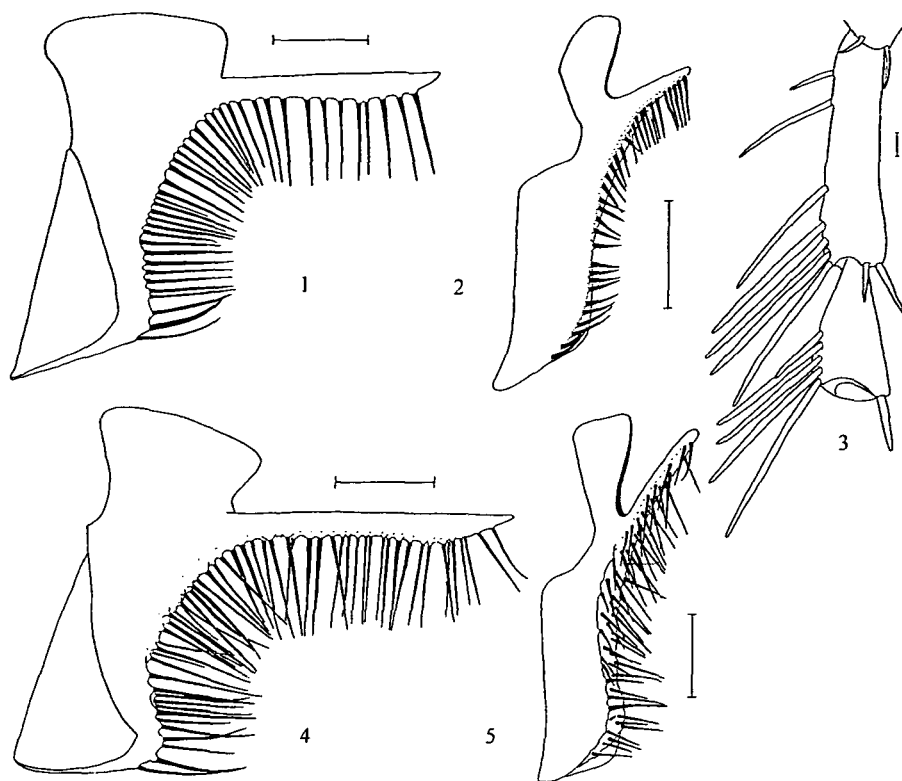
Coloration. Apical half of mandibles, distal parts of tarsi and tegulae are reddish. Abdomen black, sometimes tergum I and apex of tergum II dark red to ferruginous or apices of terga I-II dark red to ferruginous, the rest is black. In Mongolian specimens usually terga I-II red or dark red, rarely also black. Other parts of body completely black.

Geographical distribution: Central Europe to Mongolia, between 43° and 53° northern latitude.

Ecological characteristic: Stenotopical, eurythermal eurosiberian species of sandy dunes and alluvial sands.

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Figs 1-5: (1) *Tachysphex austriacus* KOHL ♂; volsella, outer side view; (2) *Tachysphex austriacus* KOHL ♂; volsella, inner oblique view; (3) *Tachysphex austriacus* KOHL forebasitarsus and second tarsus; (4) *Tachysphex pompiliformis* (PANZER) ♂; volsella, outer side view; (5) *Tachysphex pompiliformis* (PANZER) ♂; volsella, inner oblique view. Scale bar = 0.1 mm.